

## WE CLAIM:

1. A vehicle impact sensor assembly having a longitudinal axis, and first and second ends for monitoring impact events in a vehicle, comprising:

5                   a first housing member,  
                      a second housing member cooperating with said first housing member to define an elongated channel,  
                      an elongated impact sensor element capable of providing signals of impact events upon deformation of said impact sensor, said impact sensor element disposed within said channel, and  
10                  a connector for electrically connecting said impact sensor element to said vehicle,  
                      whereby said first and second housing members closeably interact to encase said impact sensor element.

15                 2. The vehicle impact sensor assembly of claim 1 further comprising electronics to process said signals from said impact sensor element.

20                 3. The vehicle impact sensor assembly of claim 1 further comprising a layer of compressible material disposed within said elongated channel and under said elongated impact sensor element.

25                 4. The vehicle impact sensor assembly of claim 1 wherein said first and second housing members cooperatively define a plate disposed in a perpendicular manner to said longitudinal axis at said first end of said impact sensor assembly and having at least one through passageway for securing said assembly to said vehicle.

5. The vehicle impact sensor assembly of claim 1 wherein said first housing member defines a plurality of localized projections disposed adjacent said impact sensor element, whereby sufficient impact exerted upon said first

housing member causes said projections to engage said impact sensor element and induce localized deformation thereof.

6. The vehicle impact sensor assembly of claim 1 wherein said second housing member further defines at least one upstanding projection having a head region and a shaft portion, whereby said shaft portion extends through said elongated impact sensor element, and said head region engages and retains said elongated impact sensor element near said second housing member.

7. The vehicle impact sensor assembly of claim 1 wherein said second housing member further defines a projecting key disposed in a lateral manner to said longitudinal axis and disposed at said second end of said impact sensor assembly.

8. The vehicle impact sensor assembly of claim 1 wherein said impact sensor element is a bend sensitive element and is selected from the group consisting of piezoelectric cables, fiber optic deformation sensors, and resistance elements.

9. The vehicle impact sensor assembly of claim 1 wherein said connector comprises a pigtail connector.

10. The vehicle impact sensor assembly of claim 1 wherein said connector is integrally formed on said lower housing member.

11. A vehicle impact sensor assembly having a longitudinal axis and an elongate channel, said assembly being situated for monitoring impact events in a vehicle, comprising:

5           an elongated deformation impact sensor element capable of providing signals of impact events upon deformation of said deformation impact sensor element, said deformation impact sensor element disposed within said channel,

10           a first housing member defining a plurality of localized projections disposed adjacent said impact sensor element, whereby sufficient impact exerted upon said first housing member causes said projections to engage said impact sensor element and induce localized deformation thereof,

              a second housing member cooperating with said first housing member to define said channel,

15           a layer of compressible material disposed within said channel and under said deformation impact sensor element, and

              a connector for electrically connecting said deformation impact sensor element to said vehicle,

              whereby said first and second housing members closeably interact to encase said deformation impact sensor element.

20           12. The vehicle impact sensor assembly of claim 11 further comprising electronics to process said signals from said deformation impact sensor element.

25           13. The vehicle impact sensor assembly of claim 11 wherein said first and second housing members cooperatively define a plate disposed in a perpendicular manner to said longitudinal axis at said first end of said impact sensor assembly and having at least one through passageway for securing said assembly to said vehicle.

              14. The vehicle impact sensor assembly of claim 11 wherein said second housing member further defines at least one upstanding projection

having a head region and a shaft portion, whereby said shaft portion extends through said compressible material and said elongated impact sensor element, and said head region engages and retains said elongated impact sensor element against said compressible material.

5           15. The vehicle impact sensor assembly of claim 11 wherein said second housing member further defines a projecting key disposed in a lateral manner to said longitudinal axis and disposed at said second end of said impact sensor assembly.

10          16. The vehicle impact sensor assembly of claim 11 wherein said deformation impact sensor element is a bend sensitive element and is selected from the group consisting of fiber optic deformation sensors, resistance elements, and piezoelectric cables.

17. The vehicle impact sensor assembly of claim 11 wherein said connector comprises a pigtail connector.

15          18. The vehicle impact sensor assembly of claim 11 wherein said connector is integrally formed on said lower housing member.

19. A vehicle impact sensor assembly for monitoring impact events in a vehicle, comprising:

an first housing member,

a second housing member,

5 a bend sensitive resistance element capable of providing signals of impact events, said bend sensitive resistance element disposed directly on either said first housing member or said second housing member, and

a connector for electrically connecting said deformation impact sensor element to said vehicle.

10 20. The vehicle impact sensor assembly of claim 19 further comprising electronics to process said signals from said bend sensitive resistance element.

21. A method of installing an impact sensor assembly into a vehicle having at least one through opening for receiving fasteners from said impact sensor assembly, comprising the steps of:

5 providing an impact sensor assembly having an elongated longitudinal axis and first and second ends, a cross-sectional shape, an electrical connector and defining a plate disposed in a perpendicular manner to said longitudinal axis at said first end of said assembly and having at least one through passageway,

10 providing an elongated mounting member having a surface and defining a main opening having a shape complimentary to said cross-sectional shape of said impact sensor assembly,

securing said mounting member to said vehicle,

15 placing said second end of said assembly into said main opening of said mounting member,

sliding said impact sensor assembly along said longitudinal axis into said main opening of said mounting member until said plate prohibits further inward sliding,

20 passing a fastener through said through passageway of said plate and into said through opening of said vehicle, and

connecting said electrical connector of said impact sensor assembly to said vehicle.

22. The method of installing an impact sensor assembly into a vehicle according to claim 21, wherein said impact sensor assembly further defines a projecting key and said mounting member comprises a c-channel having a narrow throat region capable of slideably receiving said projecting key.

23. The method of installing an impact sensor assembly into a vehicle according to claim 21, wherein said mounting member is scored at various locations on said surface.